

# Multi-Element Lean Direct Injection Combustor Single Element Demonstration, Phase I

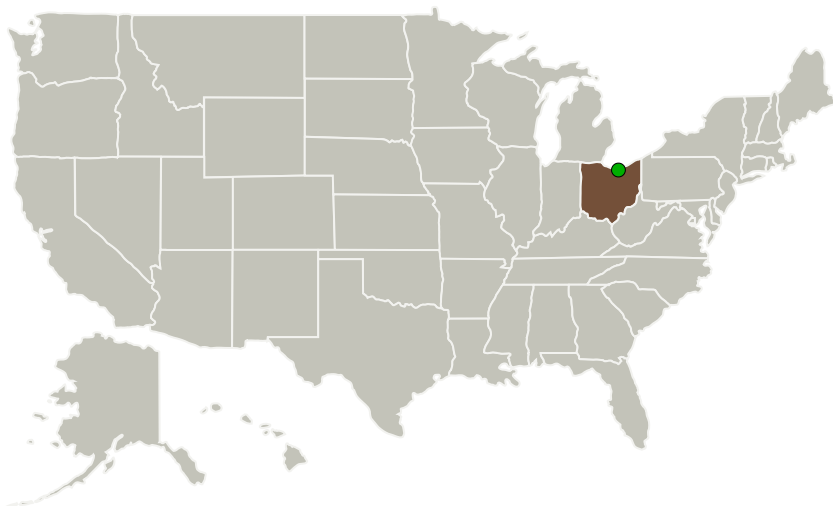
Completed Technology Project (2010 - 2010)



## Project Introduction

We propose to demonstrate the feasibility in a single element of a Multi-Element Lean Direct Injection, ME-LDI, Combustion concept. The concept will have the following innovative features: 1. Independent, mini burning zones created by containing the flame in a cylinder downstream of each fuel injector/swirler element in a multiple fuel injector array, see figure 1. The independent burning zones will enable fuel staging the fuel injectors (turning off fuel to selected fuel injectors) to cover the operating cycle, such that at each point of the operating cycle the combustor will have high combustion efficiency (>99%) and low NOx emissions. At high power conditions the combustion efficiency should be greater than 99.9%. 2. A plain-jet hypodermic fuel injector fuel injector will be incorporated into ME-LDI that is low cost and simple to manufacture but a highly effective atomizer. Modified plain-jet fuel injectors will be studied including an injector with a tip that has a diverging nozzle and one that has a spin chamber at the exit. These alternative plain-jet fuel injectors will increase the surface area at the exit of the injector resulting in a thinner film for better atomization and fuel-air mixing. 3. A restrictor plate upstream of each fuel injector to provide a steady flow to each fuel injector and prevent any feedback from an unsteady flame to the fuel supply

## Primary U.S. Work Locations and Key Partners



Multi-Element Lean Direct Injection Combustor Single Element Demonstration, Phase I

## Table of Contents

Project Introduction	1
Primary U.S. Work Locations and Key Partners	1
Project Transitions	2
Organizational Responsibility	2
Project Management	2
Technology Maturity (TRL)	2
Technology Areas	3
Target Destinations	3

## Multi-Element Lean Direct Injection Combustor Single Element Demonstration, Phase I

Completed Technology Project (2010 - 2010)



Organizations Performing Work	Role	Type	Location
Sun Valley Technology	Lead Organization	Industry Minority-Owned Business	Warrensville Heights, Ohio
● Glenn Research Center(GRC)	Supporting Organization	NASA Center	Cleveland, Ohio

## Primary U.S. Work Locations

Ohio

## Project Transitions

**January 2010:** Project Start**July 2010:** Closed out**Closeout Documentation:**

- Final Summary Chart(<https://techport.nasa.gov/file/139256>)

## Organizational Responsibility

**Responsible Mission Directorate:**

Space Technology Mission Directorate (STMD)

**Lead Organization:**

Sun Valley Technology

**Responsible Program:**

Small Business Innovation Research/Small Business Tech Transfer

## Project Management

**Program Director:**

Jason L Kessler

**Program Manager:**

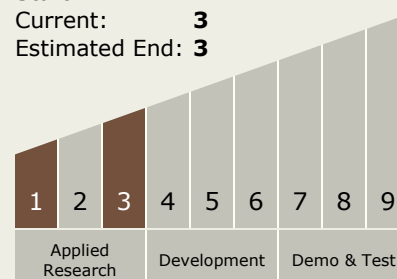
Carlos Torrez

**Principal Investigator:**

Tai Y Sun

## Technology Maturity (TRL)

Start: **1**  
 Current: **3**  
 Estimated End: **3**



# Multi-Element Lean Direct Injection Combustor Single Element Demonstration, Phase I

Completed Technology Project (2010 - 2010)



## Technology Areas

### Primary:

- TX03 Aerospace Power and Energy Storage
  - └ TX03.2 Energy Storage
    - └ TX03.2.2 Electrochemical: Fuel Cells

## Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System